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SECRETARY OF AGRICULTURE

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★ THIS MONTH ★

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WELLINGTON BRINK
Editor

SOIL CONSERVATION is published by direction of the Secretary of Agriculture as administrative information required for proper transaction of the public business. The printing of this publication has been approved by the Bureau of the Budget, July 29, 1954. SOIL CONSERVATION supplies information for workers of the Department of Agriculture and others engaged in soil conservation.

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FARM IMPROVEMENT AWARDS.—Some 80 chapters of the California Young Farmers Association are eligible to participate in a statewide Farm Improvement Program under a joint project of the Young Farmers' state organization and the Sears, Roebuck Foundation.

Designed to stimulate both immediate and long-range individual farm as well as general community improvement, the program offers chapter and individual awards for 1-year and sustained 5-year programs. Awards will be broken into local, regional and state brackets. They will consist of cash grants, trophies and plaques.

A LASS ON THE LAND.—Miss Sylvia Smith, a 17-year-old high school student of Kinards, is one of the youngest soil conservation district cooperators in South Carolina. She produces beef cattle, sericea, alfalfa, and fish on a farm given to her by her father this year. One of her first acts was to gain the assistance of her father and the local SCS technician, T. B. (Dad) Amis, in preparing a complete soil and water conservation plan, thereby becoming a cooperator with the Newberry Soil Conservation District.

Editors are invited to reprint material originating in this magazine.

FRONT COVER.—In New England there is one harvest that comes in late winter, when the maple trees are being tapped. This fine picture was made by a photographer of the Department of Agriculture in Chittenden County, Vt. The farmer's sugarhouse is in full steam.

All orders go to the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

The Hydrologist Looks Upstream

As a key man on the technicians' team, a hydrologist must avail himself of all pertinent information and data at hand. Watershed problems are widely varied, and must be met by a varied attack.

By H. O. OGROSKY

PLANNING a watershed is very much like planning a home. A good house is designed to meet the needs of a family. Its location or site must be considered, not only from the standpoint of providing the family needs but also to provide a pleasing appearance. It must be properly heated and lighted, and contain water and sewer facilities. And it must be within the means of the prospective owner.

The planning and construction of a modern house is not a one-man job. The architect who provides the overall plans usually seeks the advice of specialists in the fields of heating, lighting, and other phases of the work. In other words, the construction of a well-designed and well-built house is a product of teamwork, with the architect in charge during planning and the construction engineer in charge during construction. Success depends on how perfectly each member of the team carries out his assignment.

The development of a watershed plan is quite similar. Its purpose is to meet whatever problems occur in the watershed. If erosion is the primary consideration, emphasis is placed on its control. If floodwater damage is a major problem, effective measures must be taken to reduce this damage. As with the construction of a home, the control measures must be considered in relation to the sites.

A basement that is occasionally filled with water because of improper drainage will result in a very unhappy homeowner. Similarly, if a dam or levee constructed to protect residents from flooding allows water to seep or break through the protective works, here too will be a group of disconsolate people.

Note.—The author is hydraulic engineer, Soil Conservation Service, Washington, D. C.

As the architect relies on specialists in the design of a home, so must the watershed planner rely on specialists in developing a sound watershed plan.

In watershed planning, the Soil Conservation Service supplies field parties of engineers, hydrologists, geologists, and economists. These form the basic core of the planning party but it is by no means the extent of the specialists utilized. Agronomists, foresters, soil scientists, biologists, and others also are at hand to lend assistance.

The hydrologist deals primarily with water. When assigned to a watershed study, he must determine how often floods of various sizes occur, how much water comes from each tributary or subdivision of the watershed, what the effect will be from the application of various measures at any point in the watershed. Information of this kind is used by the design engineer in determining the spillway capacity of dams. The economist utilizes such information to evaluate the effects of the program in monetary terms. It is quite evident from these two examples that the success of a watershed program depends on the hydrologist as well as on the geologist, the design engineer, and all of the other participating specialists.

The science of hydrology is relatively new. Since it deals with the behavior of water in the atmosphere, on the ground surface, and underground, it is associated with such other sciences as meteorology, hydraulics, climatology, geology, agronomy, forestry, and soils. The hydrologist engaged in watershed studies has an exceedingly complex assignment. He must have sufficient understanding of the bordering sciences to know when it is advisable to seek guidance from specialists in other fields.

At the present time the Service is laying a basis for vastly improved water management.

We can always build protection works that will be safe by greatly exceeding what we expect to happen. But this is not always economical. We should be able to design works for water management that are safe and adequate but are also economical. Good planning in all fields will help to provide *more protection per dollar of cost.*

Recent legislation makes it possible to treat watersheds and to measure the results under the many different conditions found throughout the United States. This, in turn, most certainly will lead to greater refinement and precision in design. The science of hydrology has been brought to the point where we now can proceed with watershed development with confidence. However, like all other fields of endeavor, there is much development to be done to increase the efficiency of our work.

The general principles of hydrology have been known and practiced throughout the world. But the exact *amounts* of change in runoff that will occur under different climates, and in soils as a result of changes in type of agriculture or land use, are not always known. Few things are more variable than rainfall and its associated runoff. How much runoff to expect on a certain watershed following a certain rain is learned by actual measurement. Information as to how much is apt to occur following certain kinds of treatment likewise comes from actual measurement.

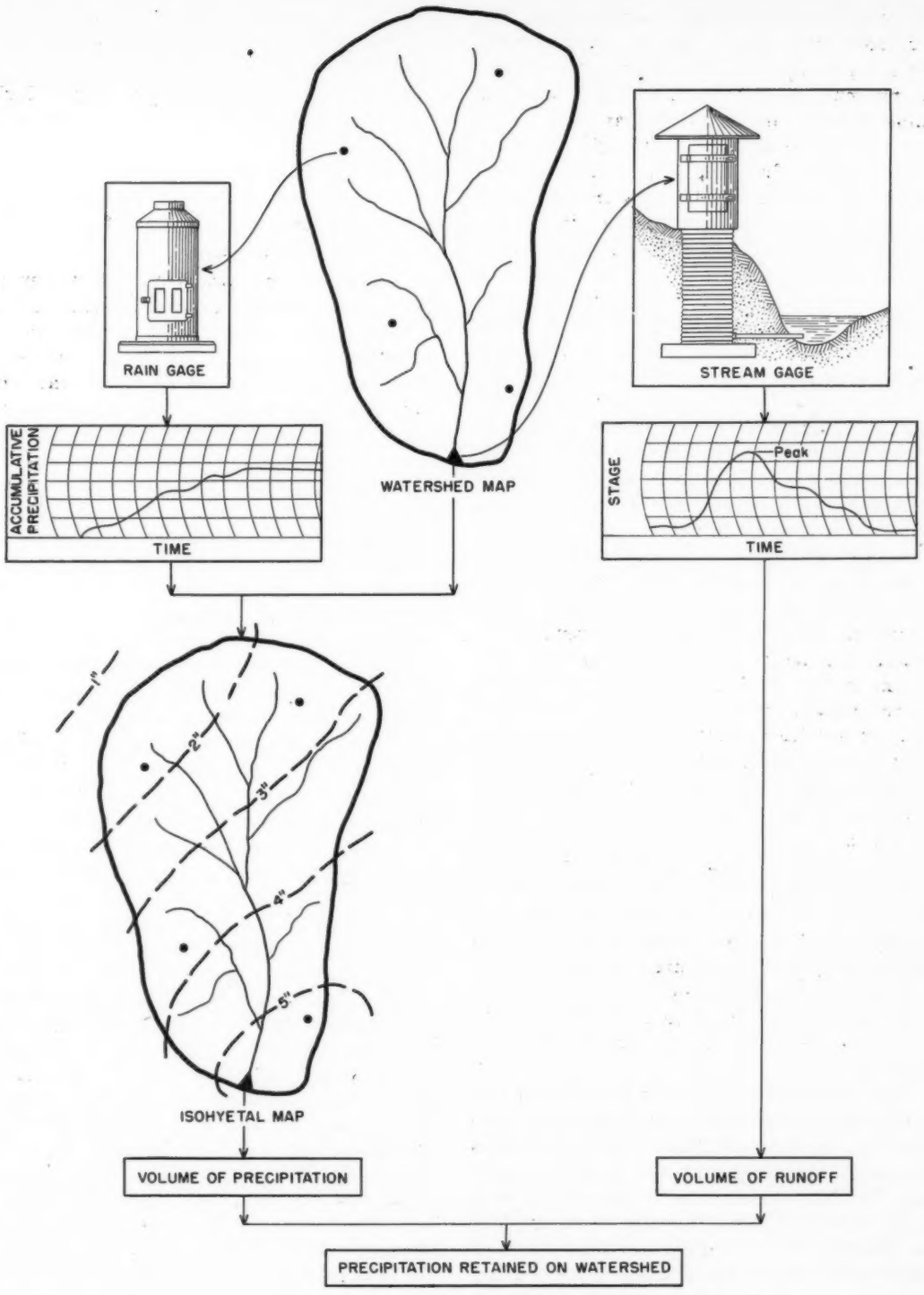
Steps already have been taken to focus all existing information on the problem, and through working relations with other agencies to provide still further needed information. The Soil and Water Conservation Research Branch of the Department of Agriculture is assembling the pertinent data on soils and vegetation, and their relation to runoff, that has been collected through the organized research of the past two decades. But this branch also is actively studying additional problems on which information is needed. This newly formed branch of the Agricultural Research Service is geared for effective and rapid progress toward getting answers to our most pressing problems.

The Weather Bureau, with its long experience in obtaining weather data, is collaborating by providing and analyzing needed rainfall records. Almost everyone knows that rainfall varies greatly (sometimes there are large differences in less than a mile), and that the total rainfall of a 24-hour period may bear no relation to the amount of runoff. We need to know more precisely the area over which different amounts and intensities of rainfall occur, and their frequency of occurrence. The Weather Bureau is helping to provide such information.

Once we know the rainfall and runoff of a watershed we can make a very close estimate of the amount of water retained on the watershed. Runoff records therefore are of great value in portraying an area's hydrology. The long experience of the U. S. Geological Survey in measuring runoff is being utilized through mutual agreement, so that runoff records are being obtained from many of the small watersheds. It is hoped to obtain the best possible information on rainfall and runoff for many types of soil, vegetation, and climates. The combined experience and facts thus obtained will lead to more effective and efficient planning for the small watershed.

The gain in information undoubtedly will be even greater than appears at first glance. Because of the real demand for more data on the response of soils, vegetation, and climates, the records from small watersheds provide opportunities in this direction not found in the existing records of the large areas which, in their composite, tend to approach an average of these conditions. But many of the small watersheds are predominantly characterized by one soil group. Often, also, a forest or a cultivated crop may be the predominating vegetation in a small watershed. Especially is this true of subwatersheds, many of which will be studied individually.

The hydrologic response of a given combination of soil and vegetation under different climatic conditions is an item on which there is little data. Yet before spillways can be precisely designed or before water-storage capacities can be accurately determined in different watersheds, more detailed data are necessary. Not only do we need to know what will be the outflow from areas differing in soils, vegetation, and rainfall, but we also need to know how often an outflow of a certain size is to be expected. Some small structures may be more


RAIN GAGE
STREAM GAGE
WATERSHED MAP
ACCUMULATIVE PRECIPITATION
TIME
STAGE
Peak
TIME
1"
2"
3"
4"
5"
ISOHYETAL MAP
VOLUME OF PRECIPITATION
VOLUME OF RUNOFF
PRECIPITATION RETAINED ON WATERSHED

efficiently designed to protect against, say, 25-year floods than 100-year floods. At the same time the probability of very large runoffs occurring must be kept in mind and weighed against the total damage they may do.

Assembling additional hydrologic information is only the first step in the efforts of the Service to improve its efficiency in watershed hydrology. Data must be presented in a manner that can be used readily on field problems. It must be in a form that can be applied in using the methods and procedures recommended by the Soil Conservation Service. Many procedures now in use by Service hydrologists involve long and tedious processes. Since the problems involved in the planning of small agricultural watersheds are not generally encountered to the same degree by other agencies, the Department of Agriculture must rely largely on its own staff to develop and improve methods and procedures in this field.

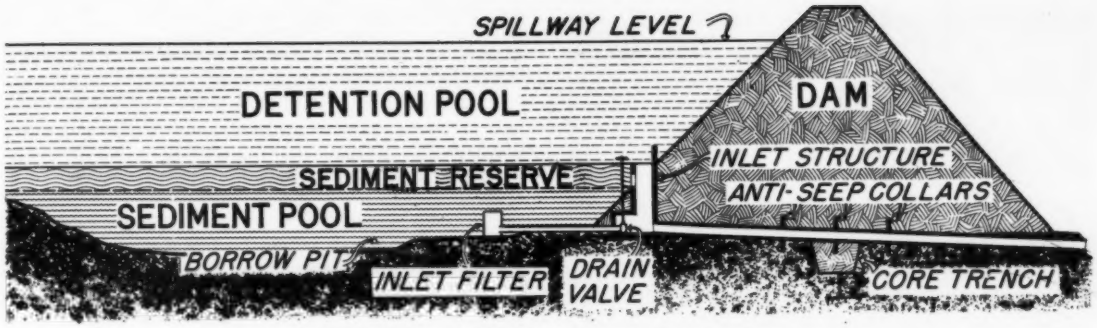
Recently the Service established a central technical unit at Beltsville, Md. for the purpose of improving the quality and efficiency of its hydrologic work. This unit is preparing a Service handbook on hydrology which will present widely used and accepted procedures and techniques. It will be used as a reference book for Service hydrologists and for training other Service personnel in the basic fundamentals of hydrology. Another activity of this unit is the preparation of a "Hydrology Guide for Use in Watershed Planning." This guide is, in effect, a testing ground for new or modified procedures and techniques that appear to be satisfactory but require nationwide testing in the field prior to their adoption as a recommended method or procedure. After a method or procedure has been field tested in all parts of the nation and found to be satisfactory, it will be incorporated in the Service's national handbook.

The hydrologist's problem in a watershed can be illustrated by a rather simple example. Assume we have a watershed with rain gages located at various points and a stream gage near the lower end of the watershed. A map of the watershed, plus rain gage data, provides the information to prepare isohyetal maps or maps with lines of equal rainfall for various storm periods (see sketch page 173). Knowing the area over which various amounts of rain fell, the total volume of precipitation over the watershed can be determined.

Similarly, a record of stream stages during the period of runoff permits a calculation of the volume of runoff from the watershed. The difference between the volume of precipitation over the watershed and the volume of runoff from a watershed is the volume of precipitation retained on the watershed.

If we have a flood problem in this watershed, there are several approaches that may be taken to reduce flood damage. One involves the consideration of measures that would not require any change in the runoff from the watershed. For example, would flood warnings permit residents to prepare for high flows and thereby reduce the damage? Would redevelopment, relocation, or zoning of the flood plain be feasible? Could local protection works be constructed that would permit the passage of floods without damage? All such measures must be considered. Usually, however, many of them can be eliminated from detailed consideration by a party reconnaissance of the watershed.

Another approach is to consider measures to reduce the stage or peak of a flood flow and thereby reduce damage from flooding. This can be accomplished in various ways, such as changing the stream channel capacity in certain stream reaches, by providing floodwater storage upstream or by increasing the amount of precipitation retained on the watershed during the storm period. In most cases it is found desirable to use a combination of measures. The improvement of the soil and cover will increase in varying degrees the amount of water retained on the watershed and also affect the rate of runoff. The changes that can be brought about by soil and cover improvement are limited, and although justified on the basis of the return to the individual landowner, do not provide adequate flood protection. Further reduction in stage can be made by retarding runoff, i.e., increasing the time and reducing the rate of runoff. Detention dams or floodwater retarding structures (see diagram page 175) which receive flood flows on tributary streams and discharge them at a fixed rate, tend to level off the peak flood flow. This measure, too, is limited to locations where suitable sites are available.



Section of typical floodwater-retarding structure.

All these measures must be considered and their effectiveness determined in various combinations. Because a structure functions well independently does not necessarily mean it will provide the same effect in combination with other works. The runoff from each tributary or subdivision of the watershed must be routed downstream through the proposed protection works to determine the effect of the works on the stage of floods of various sizes.

This illustration serves to point out some of the problems that the hydrologist, as well as others, must deal with in planning a watershed. But, if the problems were always as simple as this example, the task would not be too difficult. Let's consider how many small watersheds we know that have 4 rain gages and a stream gage. We are seldom this lucky. The hydrologist needs to provide answers to these problems, regardless of the data available. If gages are not located in the watershed he must utilize all the information he can, such as recorded high water marks, bucket surveys of rainfall, and data in adjacent watersheds.

He must go at the problem from many angles and check and recheck his results. Solutions can be worked out for these problems but where data are not directly applicable, considerable time must be spent to do a satisfactory job.

In carrying out watershed work, the Soil Conservation Service provides all of the resources it can to assist its field hydrologists to do an adequate and efficient job. Data and research results are being obtained from the U. S. Weather Bureau, the U. S. Geological Survey, and the Agricultural Research Service. Handbook material is being prepared and distributed and new methods and techniques are being developed for field testing by the Service's central technical unit.

Experienced hydrologists are field testing new methods and techniques in all parts of the Nation. We now have the wheels in motion that will permit Service hydrologists to do a better and more efficient job in all parts of the Nation than has ever been possible in the past.

ORDERLY EXITS FOR WATER.—Grass waterways are doing to Wisconsin farmland what fashion designer Dior is doing to the female figure—giving it the "flat look."

This tailoring process checks soil erosion, according to Al Wojta, soil conservation specialist at the University of Wisconsin. He says land can't soak up all the moisture from heavy rains and melting snows. Three to six inches of excess water runs off each Wisconsin acre every year. To carry it off safely, the first step is to tone down high spots and fill in gullies with a grader, scraper, or plow. Follow natural draws, Wojta advises.

This expert suggests that you use a wide V-shaped channel with a dished bottom in tailoring your waterway. Allow 20 feet of width for every foot of depth. This pattern will hold soil in place and allow for easy crossing with farm machinery.

Most important steps, says Wojta, is to level off extra soil so there's a gradual slope to center. During heavy runoff, a bank on either side would leave wet spots and soon result in three waterways instead of one.

A grass waterway fits into an overall controlled drainage system with diversion ditches and terraces.

DISTRICT PROFILE

HENRY H. HACKMAN of PENNSYLVANIA

ABOUT a decade ago, in the hills northwest of the borough of Manheim in Lancaster County, some Pennsylvania Dutch farmers were astounded to see their neighbor rip out a brand new fence. The fence had been solidly erected in straight lines and now Henry H. Hackman, the "offending" farmer, had rebuilt this fence in sweeping curves to fit his new field layout. To this conservative community, such action was akin to lightheadedness, since it was a waste of good money to tear down a new fence and rebuild it nearby. Now, 11 years later, the neighbors have changed their thinking.

Henry H. Hackman.

Hackman has emerged from this fence episode to become one of Lancaster County's most highly respected and most enthusiastic exponents of soil and water conservation. He can show his community an increased livestock carrying capacity. His 5-cow herd has grown to 20; he gets yields of 45 bushels of wheat on land that formerly produced less than half of that; he harvests 65 bushels of barley instead of 45; and it has taken a 12-foot addition to his corncrib to handle the yield from a reduced corn acreage. Hackman says that high yields begin with the soil "and we could never produce what we do today if we hadn't stopped the soil from washing away."

Henry Hackman's farm consists of 25 acres of pasture, 12 of winter grain, 12 of corn, 11 of lima beans and peas, 9 of a sorghum-soybean mixture, 23.5 acres in grasses and legumes for silage, and the balance in woodland. The original cropland layout was in 3 fields. Now, Hackman has 12 fields, from 1.5 to 6.5 acres in size. These fields are on the contour and planted alternately in row crops and close-growing crops.

The present aim in the development of the conservation plan for the farm is a long-range pasture reseeding program. Hackman started last fall by discing 8 acres of old bluegrass pasture, seeding it to Balboa rye for late fall and early spring pasture, and plans to seed ladino clover and orchardgrass next spring.

Hackman installed the contour strips himself, with the aid of an SCS technician, doing this work in the evening after school was over for the day, and on Saturdays.

This farmer was born on a farm near Oregon, Pa., a small village about 3 miles southeast of where he now teaches physics, biology, and chemistry in the Warwick Union High School. He turned to teaching after graduating from Elizabethtown College, to earn more money for additional schooling. He earned a masters degree at the University of Pennsylvania and formerly taught 10 years at Newville.

Henry Hackman has a herd of registered Holstein Friesian cattle which, in 8 years of D.H.I.A. testing, has dipped below the 400-

pound butterfat and 11,000 pounds of milk average only three times. He is a director of the Lancaster County Soil Conservation District and of the Lancaster County Holstein Friesian Cattle Association; a member of the Manheim Rotary Club. He sings in the choir and teaches a high school age class of boys and girls at the Elizabethtown Church of Brethern. The Hackman's have three children—Dorothy (Mrs. John Grace), Willard H., 16; and John A., 7.

Despite his pressing school schedule, and his numerous other activities, Hackman finds time to further the work of his conservation district. He talks before groups, and appears with exhibits at community fairs.

Appropriately, the farm is named Runnymede—the name of the meadow where King John of England signed the Magna Charta. "It means 'freedom' to us and that is how we feel about farming," Hackman explains.

—W. MARTIN MUTH

Jesse Culp in a tape-recorded interview on the farm with J. P. Johnson, a supervisor of the Northeast Alabama Soil Conservation District.

A Voice for Districts

By JOHN M. CROSS

THE slogan, "Serving the nation's most thickly populated area," has a familiar ring in the Cumberland Plateaus and the narrow valleys of north Alabama.

Chances are when you hear it, it is being phrased by a familiar voice, too—that of Jesse Culp of radio station WAVU, Albertville, Ala. His words reach 30,000 farm families every day in parts of the northeast Alabama and Coosa River Soil Conservation Districts.

Jesse Culp begins his farm programs about the time folks are getting up in the morning, and he's back again when they sit down to lunch. Soil conservation districts in the area consider him one of their best friends. He attends numerous district supervisors' meetings, and he is always accompanied by his much-traveled tape recorder.

As soon as his early morning programs are over, he is usually off to visit one or more of the many farm families in the range of his six-station hookup. The clatter of machinery building a pond or drainage ditch, the hum of tractors building terraces, or the lowing of cattle on a good pasture goes onto the tape along with the voice of the farmer doing the conservation job.

Jesse Culp is an artist in the use of human interest. He keeps informed enough to ask leading questions and bring out the story in the farmer's own words. Any farmer who is doing a good job of soil and water conservation on his farm is likely, sooner or later, to be interviewed. His story will go out over the air to 10 Alabama counties.

Jesse is always ready, too, to meet special situations as they arise. Some years ago when

(Continued on page 192)

Note.—The author is work unit conservationist, Soil Conservation Service, Guntersville, Ala.

Tioga County's Small Marsh Program

Typical site for a small marsh development.

By JOHN J. WHALEN

New York State Conservation Department

IN 1949, when representatives of the New York State Conservation Department arrived in Tioga County with their new program, Federal Aid Project 48-D, "Improvement of Wildlife Habitat on Private Land Through Soil Conservation Districts," they were met with a warm welcome. Included in this project was a provision that provided financial support and technical assistance to landowners interested in building small, shallow-water marsh areas for wildlife. The directors of the Tioga County Soil Conservation District immediately accepted this small marsh idea. They included it in their conservation activities and assisted project personnel wholeheartedly with their time, money and equipment. The publicity accorded by the district eventually caused the project to reach the farmer and expand throughout the county.

Federal technicians attached to the district took over the difficult job of finding sites suitable for marsh construction. Arthur Lord, work unit leader, soon came up with the first marsh prospect—a flat 9-acre alder run on the farm of Russell Lippencott, in the top of the Pipe Creek watershed in the western part of the county. Project personnel immediately went to work on the site. The survey and design were completed and the construction cost estimated. The owner agreed to pay for the earthwork and install the trickle tube. Soon the first marsh in Tioga County was completed.

The news spread. Hundreds of people visited the site. Much to the amazement of local pessimists, 3,000,000 gallons of water ran off the 90-acre watershed, and in a month's time the marsh was filled with water. Local soil conservation officials liked the 11 acre-feet of flood storage embodied. Farmers liked the stock water. Sportsmen liked the wildlife. Everyone was pleased to see large numbers of migrating waterfowl utilizing the new pond.

Although the program has changed considerably in 5 years, in essence the foregoing story has been repeated many times in Tioga County.

To date, 68 small marshes have been installed here under the 48-D program. They vary in

size from 1.5 acres to 22 acres. The average is 5.4 acres. A total of 367 acres of land has been flooded. These marshes normally contain 239,928,000 gallons of water. In periods of heavy rainfall, they will store an additional 403 acre-feet of water.

Most people feel that at last a program for controlling heavy runoff, so destructive at times in hilly Tioga County, has begun. Efforts thus far are small in comparison with the total problem, but the ever-increasing activity should get results over the coming years. This activity, taken with the efforts of other agencies which have entered the flood control picture in the county, should go far toward solving a major problem.

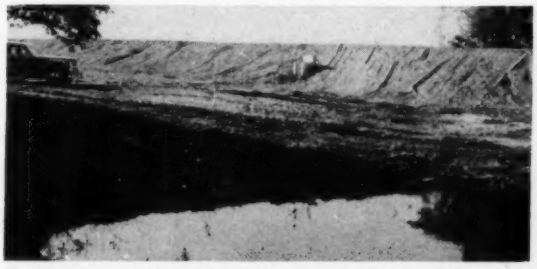
The hill farmer on whose land a marsh is built is assured adequate stock water during drought. Formerly, many farmers were forced to haul water for their stock from the nearest large stream in even moderate drought. This was both time-consuming and difficult. In the future, we hope that this task will be eliminated.

Flood-control and stock-water benefits are the most important in the county. They directly affect the threats of lost income and property destruction. Other lesser benefits also are apparent. Fire protection to nearby buildings is one. In a low income county such as this, the possibility of realizing a return from fur always exists. Not too much interest in this possibility exists now, but in the future management of the marshes for their fur returns should gain some recognition. Other benefits include fishing, swimming, skating and the pleasure of observing wildlife attracted by these marshes.

The New York State Conservation Department receives almost immediate returns from the program. Most apparent is the utilization of the marsh areas for nesting, resting and feeding waterfowl. The first spring following construction, a marsh invariably has one or more successful wild broods of ducks. Observations on the Tioga marshes indicate that on an average 3 acres of marsh produce 1 brood of ducks. Typical of waterfowl nesting response is the Hindrickson marsh in the eastern part of the county. The marsh construction was completed at the end of June 1951. Thirty-five days later a brood of young wood ducks was observed on the half-filled marsh.

Indications are that during the spring and fall migration periods, there is heavy and constant use of the marsh areas as resting places for waterfowl. As many as 60 wild geese, and flocks of from 50 to 500 ducks, were noted at various times. Signs indicate other forms of wildlife are also benefited. Tracks of deer, rabbits and pheasants are commonly encountered.

Tioga County is not the most ideally suited county in the State of New York for marsh construction. The hilly terrain does not permit an abundance of natural marsh sites. Yet, this county has had the most successful marsh construction program in the state. This success is due primarily to the genuine interest displayed in the program by local farm agencies, the desire of the landowner to make the best use of the land at his disposal, and the friendly relations that exist between the local Soil Conservation Service technicians and the New York State Conservation Department personnel. These are the keys that made the program what it is today. With them, much has been done; without them, little or nothing would have been accomplished.



Earthwork and trickle tube on an early small marsh in Tioga County.

NEW LEAFLETS AVAILABLE.—Four new leaflets in the John Douglas Bulger series of recommended projects for conservation clubs and youth groups have been announced by the National Wildlife Federation: "Let's Plant Willows," "Let's Give a Tithe for Trout," "Brush Shelters for Wildlife," and "Let's Boxtrap Bunnies."

The leaflets may be obtained by writing to the National Wildlife Federation, Washington 12, D. C. Single, free; bulk orders, 5c each.

Above.—A 15-foot fire lane circles the tree farm, and redigging the lane is done by an 8-disc tractor-pulled plow.
Below.—On a recent inspection tour: M. A. Peters, W. T. Odom, W. H. Thompson, Harry J. Hammet, Earl P. Barrios, and H. Ford Fallin.

Tree Farm Casts Its Shadow Far

Two million pine seedlings planted by a railroad replace an old sandpit and serve as a public demonstration of sound woodland management.

By R. A. MALONE

ON a picturesque 133-acre tract of land in the rolling hills country of northwestern Louisiana there is a most unusual facility of the Texas and Pacific Railway Company. It's a railroad farm—T&P's Tree Farm!

On certain days during the past few years, passersby may have been somewhat amazed to see forestry workers on this railroad property. They might have noticed a tractor-pulled 8-disc plow circling the fragrant pine-covered hillsides, plowing up a 15-foot-wide lane. It's a fire lane, protection against forest fire.

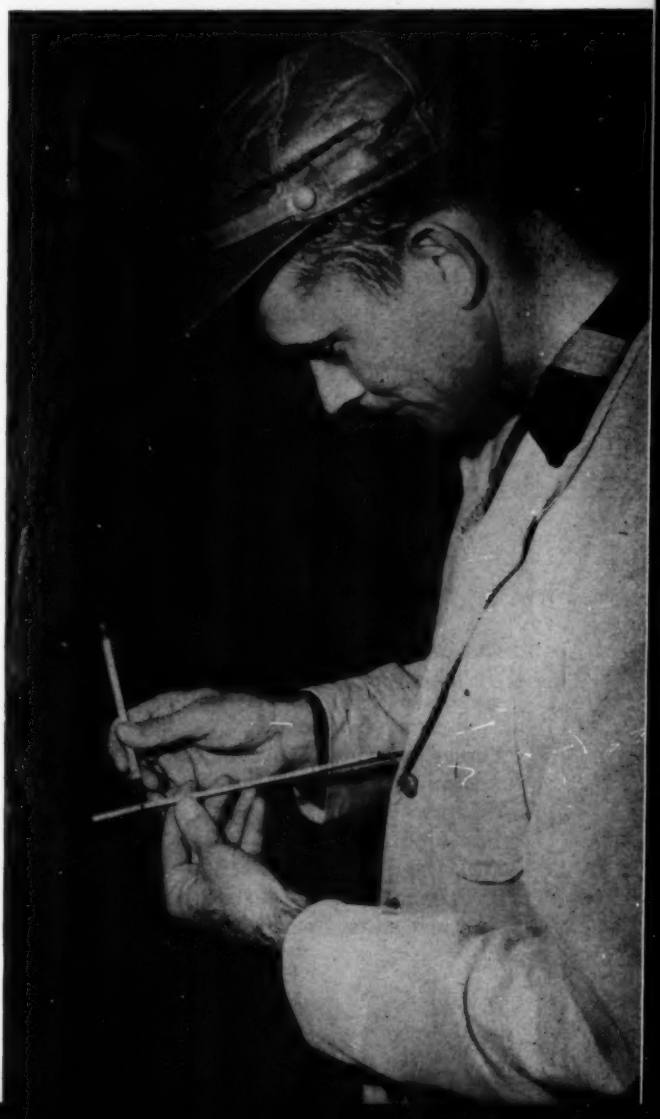
They might have seen a sled-like apparatus also being pulled by a tractor over certain stretches of flat sandy land amid this sprawling wooded sector. If close enough, they would have seen a forestry worker on this woodland toboggan deftly inserting pine seedlings in the rows cut by its plow blade. This machine is a mechanical tree planter and little loblolly pines were being planted.

Onlookers hardly could have seen other workers down in the gullies on this land. But, they were there. Some might have been using a paint gun, squirting little dabs of paint on the trees—trees they were marking for deadening or for cutting. Other workers might have been using a spade-like implement in these gullies or in the stump areas. This implement, a forester's bar or dibble, is used as the fastest method of seedling planting in places not accessible to the mechanical tree planter.

These forestry folks on this railroad land were woodland-wise workers of the Upper West Red River Soil Conservation District and woodland conservationists of the U. S. Department of Agriculture. During these past few years they have been transforming this T&P property, formerly a sandpit, into a budding tree farm.

When the railroad acquired this property, a half-century ago, it bought the land, not for a tree farm, but to provide essential sand and dirt needed to build up the right-of-way for its trackage through the Bayou State. The deep pits and gullies are mute evidence of the transfer of tons of sand and dirt for the railroad roadbed.

Fallin checks age of this pine by counting rings in trunk core drilled from tree.



Note.—The author is Public relations representative, Texas and Pacific Railway Company, and Editor of *Farming and Ranching Along the T&P.*

Harry Hammet squirts two dabs of white paint on a merchantable pine tree, marking it for cutting.

Bar-planting (using a dibble, a spade-like implement) is done in replanting where little pines have failed to survive and in areas not accessible to the mechanical tree-planter. There is no kneeling—that takes too much time and energy.

Peters holds his woodsman's rule at arm's length and breast high to calculate the diameter of this tree.

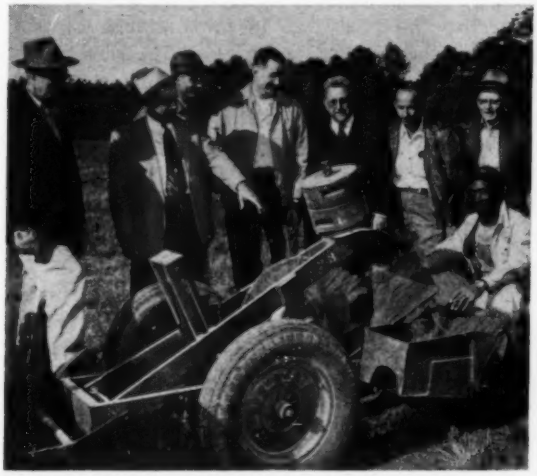
For a long time, however, T&P hasn't used this old sandpit, and towering native pines have grown up there.

Just 4 years ago, without any fanfare whatsoever, the Texas and Pacific, concerned with the conservation of the natural resources of the nation, started a reforestation program on this old sandpit property in cooperation with the Soil Conservation Service of the U. S. Department of Agriculture.

Conservation, like T&P tonnage, covers everything, and it has a tremendous effect upon the national economy. It is becoming more and more evident and essential that the soil, water and forests must be conserved. Woodlands, properly managed, conserve not only timber but soil and water as well.

A tree farm, of course, cannot be developed overnight. "Only God can make a tree," wrote the poet Joyce Kilmer. While that is true enough and while it's also true that it takes

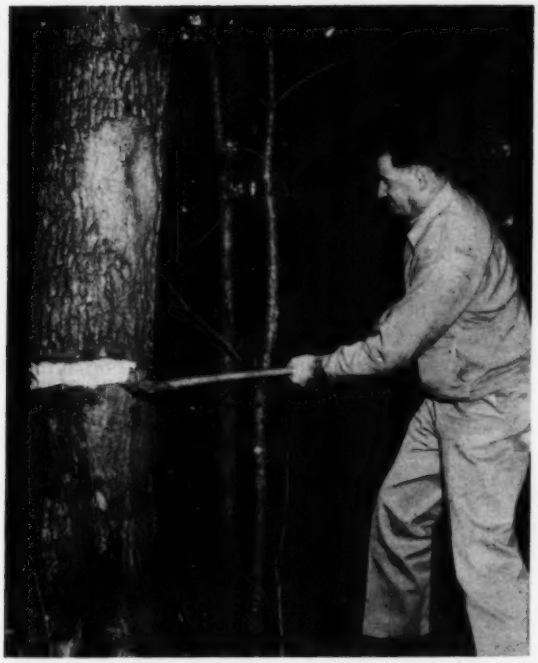
Loblolly pine seedlings ready for planting, their roots lightly covered to keep them moist and fresh. In these three short rows are about 20,000 seedlings.



Mechanical tree planter holds attention of (l. to r.) Methvin, Thompson, Fallin, Peters, Barrios, Hammet, Odom, and Fuggin.

time—lots of time—for timber to grow, actually Mother Nature is a poor developer in comparison with the woodland conservationists of the Soil Conservation Service.

It was the hope of the Texas and Pacific that these colorful acres, in time, would serve as a model tree farm for the benefit of timberland owners to illustrate how even an old sandpit can be turned into a woodland wonder. To a certain extent that hope of the railroad *already* has been realized.



Deadening an inferior tree by girdling. Note diseased spots above and below the girdle.

The birth of this unique railroad project started in the summer of 1950 during a casual conversation between two oldtime friends, both of whom long have been concerned with the promotion and conservation of Louisiana's agricultural resources, State Conservationist H. B. "Joe" Martin and T&P Agricultural Agent Earl P. Barrios. The talk drifted around to the old railroad sandpit. Barrios wondered about converting it into a tree farm, perhaps?

"I can't think of anything that would be more influential and effective than for the T&P to turn this land into timber, to practice good timber management on your old sandpit tract," said Martin.

That was the beginning. The building of this "budding" tree farm started the next spring, in 1951, and has been in effect since.

Expert forestry methods, technical guidance and assistance have been provided through the Upper West Red River Soil Conservation District. This district embraces more than a million acres in northwest Louisiana and is headed by Supervisor W. H. "Bill" Thompson. In addition to Martin and Thompson, SCS workers

who have been instrumental in the reforestation project include M. A. Peters, H. Ford Fallin, Harry J. Hammet, and a number of aides and assistants.

The woodland plan being followed by the railroad and the technicians is a seven-point program: (1) profect from fire and grazing; (2) thin dense clumps of trees; (3) follow time schedule in cutting operations; (4) take crop trees at rate of one per acre per year; (5) take poorest trees first to improve quality of woodland; (6) remove absolute culls (inferior trees) by girdling, felling or poisoning; and (7) plant or underplant open areas not reseeding naturally.

Trees are thinned to what is called "D-plus-6 spacing." To determine the space required for each tree, an average diameter of the trees is calculated and to this average figure, 6 is added. The sum, oddly enough, is called feet. For example, three trees 8, 10 and 12 *inches* in diameter have an average diameter of 10 plus the 6, to make 16 *feet* required for proper spacing between the trees.

Diameters are calculated by using a woodsman's rule, holding it at arm length against the tree trunk and about 50 inches above ground, which is about breast high for the average woodsman. "DBH" (diameter breast high) is a standard term in the timber world.

In following the time schedule, a general cutting is made every 6 years. It is significant, however, that this cycle is not necessarily followed in the thinning of pulpwood and post-sized trees.

Culling inferior trees in a woodland is the same as keeping weeds out of a cotton patch or a cane field, it prevents worthless vegetation from reducing the yield. Culling allows ample room for the remaining trees to grow and develop, permitting adequate sunlight and soil moisture to penetrate and increasing thereby both the quantity and quality of merchantable timber.

Trees are marked distinctively for selective cutting and for deadening. Those to be cut for merchantable timber are marked with two little dabs of paint (usually white or yellow on Louisiana timber) with one splotch about breast high or higher and the other near the ground. Culls are marked with an "X."

Three-year-old pines thriving against background of fine timber. A tree-planter is setting out seedlings between young and old growths.

There are three general methods of deadening trees: felling, poisoning and girdling. To describe the first two is to comment on the obvious, but girdling may be of interest to the layman. A girdle on a tree is a band cut around the trunk about 3 inches wide and just deep enough to clean off the bark and thus kill the tree. It requires skill. If cut too deep, undesirable sprouting often results. An expert axe-wielding woodsman, believe it or not, can girdle a 22-inch-DBH tree in a mere few minutes.

And speaking of speed in forestry, the Service-directed timberland workers with a mechanical planter can plant from 1,000 to 1,500 seedlings *per hour!*

The first planting of pine seedlings on the tree farm, which is located just on the outskirts of Shreveport, was in January 1952, when 10,000 seedlings were put out. The next January some 25,000 more seedlings were planted, with an additional 35,000 planted in December 1953. This last December approximately 30,000 more were planted.

The seedlings set out were loblolly pine, which seems more suited to climatic conditions in Louisiana's Caddo Parish than any other of the many varieties of pine. And, actually, most of these loblolly seedlings were replantings.

The drought has taken a fearful toll each year since the tree farm started. Despite this continuing drought which has killed so many seedlings, the Texas and Pacific has gone ahead

in this project and has not hesitated to replant. It's encouraging to note that most timberland owners in this section of Louisiana have followed suit and also have replanted.

Timber is important in Louisiana, and the Bayou State is growing trees. It is not, however, the land of sawmills that it once was.

Harry Hammet finds picturesque beauty in healthy and flourishing pines of any age. He stands near a group of 10-year-old trees against a backdrop of 25-year-olds.

The state has more than a million acres in unproductive timberland. Moreover, during the past 5 years on the average, 37 acres of forest goes up in smoke every hour of every day in Louisiana! That's a staggering fire toll! Indeed, it alone points up the need for conservation.

The tree farm with its 133-acres of picturesque woodland is a setting of scenic splendor and is ideal for timberland. On the hills the old pines and some hardwoods tower majestically. Even in the gullies are many stately pines with DBH measurements of around 14 inches which, for their age, is a "high average for Caddo Parish," according to Conservationist Ford Fallin.

And, the growing number of little 1-, 2-, and 3-year old pines flourishing on the old railroad sandpit property are something to see. To the woodsman, they are as pretty as a litter of puppies to a dog fancier.

The Soil Conservation Service, of course, is glad to see the T&P and other railroads join in this service toward conservation. In some timberland areas, native trees grow so thick they appear very much like the "impenetrable forest," while in other sections virtually no trees grow at all. Good timberland management corrects conditions like these.

"Consistent improvement in the development on the tree farm," said Conservationist Peters "is evident with each passing year. The young trees look good and where old culls were deadened, new and strong pines are coming up."

Proximity of the tree farm to the soil conservation district's Shreveport office makes it convenient to show interested persons various phases of timber development work being carried out on the railroad property.

"Classes of school children, even those not yet in their teens, have toured the tree farm

(Continued on page 192)

Cooperating toward a common goal: Barrios and Hammet meet under a sign typifying the resolve to improve Louisiana forestry.

An Inside Look at the Soil

By C. L. W. SWANSON

WHEN most people think of soils, they visualize only the first 6 or 8 inches, known as the plow layer. Some think only of the surface.

Soils do have depth, and their "insides" vary tremendously from soil to soil. These variations are important in plant growth. We know for example, that plant roots, especially those of trees and certain crops, penetrate the soil to considerable depth.

When you look at the soil to about a 3-foot depth you soon realize that soils have their own special "character." They are usually made up of several layers or horizons. Each layer has a color, structure, texture, and organic matter content different from that of the other horizons. The sizes, amounts, and kinds of minerals and rocks also vary among the layers.

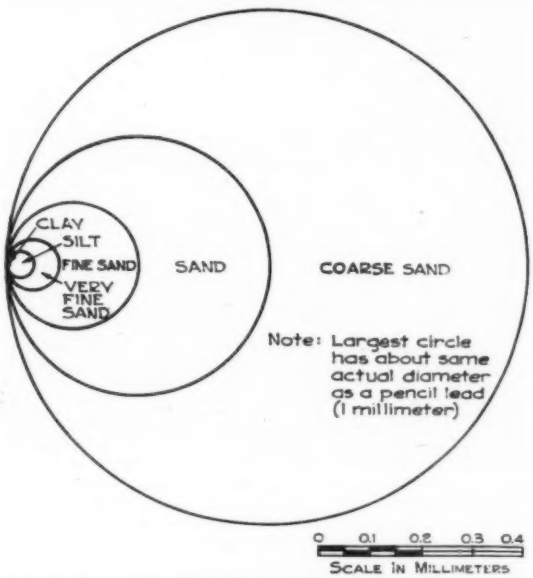
A typical soil is made up of sand, silt, clay, and organic matter. Usually it contains about 50 percent air space, which is made up of the pores and spaces between the soil particles and aggregates.

The drawing showing particle sizes gives some idea of the relative size of the various fractions. On a comparative basis the largest sand fraction is no larger than the lead in a pencil. The clay fraction is much smaller and can hardly be seen in the illustration. Actually, a clay particle measures 8-millionths of an inch and smaller.

Organic matter, made up of dead plant and animal materials, is also found in varying sizes depending on how well it is decomposed. Clay-size organic matter is called humus. Amounts of organic matter vary in soils, with the average ranging from 3 to 5 percent.

To learn something useful about clays, one needs to take an inside look at them. Only then can we find out what really makes a soil "tick."

Note.—The author is chief soil scientist, Connecticut Agricultural Experiment Station, New Haven, Conn. Based on an article in *What's New in Crops and Soils*, August-September 1954.



Relative sizes of the different soil particles are shown here. Coarse sand particles reach the diameter of a pencil lead. A clay particle measures only 8 millionths of an inch, and may come in even smaller sizes.

Clay is made up of extremely small minerals. Most of the clay minerals are particles ranging from 1-millionth to about 8-millionths of an inch in size. Because of their small size, clay minerals actually act like chemicals.

Clay and organic matter are the most important components of the soil because they play an active part in so many soil processes. They determine, to a large extent, whether or not you have a good soil for growing crops.

The clay fraction has what is known as the *exchange complex* of a soil. The amount of this material determines the soil's *exchange capacity*, in other words, its ability to hold and release such key plant food elements as calcium, potassium, and magnesium. When these elements are taken up by clays, it means that they cannot be leached readily from the soil. They are held in and on this exchange complex and are made available to plant roots as they are needed.

The mechanism of how this occurs can be explained rather simply. Clays are made up of

minerals of several kinds. Basically there are two groups of these minerals. All of them are more or less plate-like in nature, with some resemblance to stacked dinner plates.

Some of the clay minerals can expand and contract like an accordion. They expand when water is added, and they contract when dried out. One group of clay minerals does not have this ability to expand or contract and remains stationary. We call this the kaolinite type of clay mineral. The other major group, which takes up water and expands and contracts, is called the montmorillonite type of clay.

The chemical makeup of these major clay minerals is shown diagrammatically in the drawings. The montmorillonite group has a layer of silica, one of alumina, and another of silica, and kaolinite, only one layer of each. These clays are sometimes called 2 to 1 and 1 to 1 clay minerals because of the chemical arrangement of these layers.

These are new words—kaolinite and montmorillonite. Soil scientists are now using them in telling about some of their experimental results.

The space between the plates of the kaolinite type of clay mineral is about 10-billionths of an inch, but it does not have the ability to increase or decrease this space. The plate space in the montmorillionite type of clay minerals averages around 40-billionths of an inch, and it can expand to about 80-billionths of an inch.

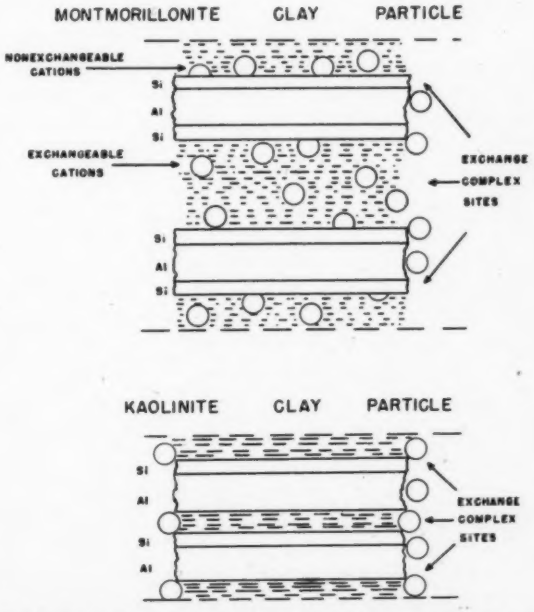
The diameters of small units of the various elements are not all the same. They vary in size—some are larger than others. For example, the potassium ion is 10.6 billionths of an inch in diameter, while the diameter of the calcium ion is about 8.5 billionths of an inch. Although calcium is smaller than potassium, calcium is always surrounded with tightly bound water. This causes the effective diameter of calcium to be greater than 8.5 billionths of an inch. It follows that, if the plates of the clay mineral do not open wide enough (see drawing of kaolinite and montmorillonite particles), certain ions cannot enter easily and thus be held in reserve. If not used by the plant immediately, they may be carried away through leaching.

The montmorillonite type of clay mineral is the most useful in plant growth. Elements like calcium, magnesium, and potassium are small enough so that they can fit between the plates of this kind of clay mineral. Attractive forces hold them between the plates strongly enough so that they are not leached out of the soil.

Some elements can stick on the outside of clay minerals due to the attractive forces of certain elements for each other, something like a magnet holds iron. These elements vary with the type of clay mineral, so some clays hold more magnesium, more phosphorus, or more potassium than others.

The element hydrogen has a "toxic" effect on the basic elements calcium, magnesium and potassium. It tends to push these elements out of the platy minerals. Growing plants give off carbonic acid, which contains hydrogen, thus providing a source of this element in the soil.

When hydrogen pushes out elements like calcium, magnesium, and potassium, they are



Kaolinite and montmorillonite are two different kinds of clay particles. Fertility in soils high in montmorillonite is easier to manage than in kaolinitic soils. Drawings show differences between the particles. Montmorillonite has a layer of silica, one of alumina, and another of silica. Kaolinite has only one layer of each, and less ability to store and release plant food.

made readily available to the roots of plants. Consequently, it is not desirable that these elements be held too tightly by the clay minerals. Of course, when they are pushed out faster than the plant can use them, those fertilizer elements are leached out of the soil.

A very undesirable situation occurs when hydrogen entirely replaces the basic elements on the clay particles. The soil becomes acid and the basic elements are leached out. The usual way to avoid or remedy such a situation is to add lime. The lime will then replace most of the hydrogen, also making room for other elements like magnesium and potassium.

Since hydrogen serves a useful purpose in soils, we do not want to drive all of it out by making our soils alkaline. We keep our soils slightly acid so that some hydrogen will be available to perform its useful duties.

Montmorillonite clays may have about ten times greater exchange capacity than kaolinitic clays. They also have the capacity to hold several times as much water. Most of the soils in Connecticut, for example, have a predominance of kaolinitic clays and are, in addition, low in total amount of clay. That means that our soils are naturally low in fertility.

In Iowa, on the other hand, the clays are of a montmorillonitic nature, and the clay content is rather high. These soils are naturally fertile.

We increase the productivity of our soils by the use of fertilizers. In the case of kaolinitic clays, when fertilizers are added, the plant food elements, as for example phosphorus, are tied up so tightly that they are unavailable to plant roots. Also only small amounts leach out of the soil. But some of our soils are high in montmorillonite clay. These soils enable us to make maximum use of fertilizers in crop production.

What does all this mean? If we could learn more about what goes on in the soil when fertilizers are applied, it might be possible for us to make more efficient use of our fertilizers.

For example, it is often said that only 10 to 15 percent of our phosphatic fertilizers are used by the crop the first year. Possibly only 50 percent of the phosphorus is ever utilized, the remaining amount being tied up on the soil clay complex. Another fertilizer element that becomes fixed rather easily and hence unavailable to plants is potassium.

If we could find how to "untie" or release, soil phosphate and potassium, we certainly would be increasing the efficiency of our fertilizers as well as conserving our important natural resources. Untold millions of dollars would be saved the farmer in his fertilizer bill.

What we need now is more research to find out what really goes on in the soil when fertilizers of various kinds are applied. Much of the work to date on fertilizers has had to do with applying them on a field basis. This has been useful work, but it doesn't provide answers to fundamental problems. For example, the phenomenon of how ions like phosphorus and potassium are tied up in the soil is not well understood.

If the physical and chemical action of minerals were well known, useful solutions to the problem of fixation of fertilizer elements would become available.

One approach is to study the soil clay complex. One of the first steps along this line is to realize that all soils are not alike. By studying the major kinds of soils, we learn something about their makeup and their properties.

On the surface, solution to this problem may appear simple. But many kinds of research tools and much hard work will be required before the desired answers are obtained. The use of radio-active minerals, X rays, atomic knowledge, and other modern techniques will help us to reach our goal.

Erosion tends to remove more of the clay and organic matter fractions than the coarser sand particles. These fractions that erode most easily go into solution more readily and remain in suspension longer than the coarser, heavier sand fractions. Removal of the fine materials means that less fertility-holding material is left. Fertilizers will then leach more quickly as well as wash down the slope along with clay and organic matter.

Actually, when thought is given to the part clays play in land use, erosion is not always bad. If we had no erosion, we would not have the fertile bottom lands of the great rivers of the world like the Missouri, the Mississippi, and the Nile.

Some soils are low in fertility and are hard

to manage because they have not had enough erosion like the Putnam clay in Missouri. These soils have weathered so long that the soil particles all have broken down into fine silt and clay particles and plant nutrients such as calcium and magnesium have long been leached out. If some erosion had occurred, the fine materials would have been washed off, and new materials exposed to weathering which would release plant nutrients from fresh soil minerals.

Usually, however, our biggest problem is to keep the fine soil particles on sloping land where they will do the most good. Clays in place generally offer less soil management problems than clays away from home. On cultivated soils especially, we should be concerned about the fertility we are losing because of erosion.

On Doing Watershed Research

No. 1

This is the first of a series of articles to appear from time to time in explanation of the various phases of research being conducted by the Department of Agriculture on problems of soil and water conservation.

By WILLIAM C. ACKERMANN

TRANSFER of watershed research from the Soil Conservation Service to the new Agricultural Research Service provides a good opportunity to review this program. It is a chance to take a fresh look at this program which has been underway since the late 1930's. It is a chance to see where that program is now with respect to its original goals, and with respect to the changed and greatly expanded needs for watershed research information.

The original research program, including the hydraulics of conservation structures, sedimentation in streams and watersheds, and the hydrology of watersheds, was soundly conceived. Activities were widely distributed geographically and climatically, and the variables of land use and management were of vital concern at that time. If the program failed to meet the original objectives, it was primarily the result of uncontrollable factors on the national and international scene rather than experimental design. During the intervening years since the studies were initiated, many locations were necessarily closed after a few years of operation. At those which were continued emphasis was placed on collection of records, to the detriment of record analysis. So today we have an accumulated stockpile of records and the unparalleled opportunity to convert this into answers which will capitalize on our considerable investment.

Our philosophy for carrying out watershed research is both short range and long range. For the short look it seems abundantly clear that our first objective must be to analyze the accumulated records, interpret them, and place the results in the hands of those responsible for planning and directing our programs of soil and water conservation. This is a fortunate time to shift emphasis from record collection to record analysis because the point of diminishing returns in length or record has been reached in many cases. We think that this analysis should be just as complete and exhaustive as the data warrant. We should go further than merely make an orderly collection of raw data available on a cash-and-carry basis to him who wants to use it. Correlations should be made, cause and effect evaluated, and the limits of application and transposition should be defined. The analysis should proceed in the order of priority of need, both with respect to type of information and with respect to location.

Ample guidance on the priority of analysis is available through the research advisory committee and through the SCS statements of research needs. Perhaps more important than

Note.—The author is head, watershed hydrology section, soil and water conservation research branch, Agricultural Research Service, U. S. Department of Agriculture, Beltsville, Md.

these have been the numerous, recent instances when conservationist and research workers have sat down together and agreed on the steps and direction to be taken.

It is important that we also keep our sights far down the road as well as on the immediate job ahead. Watershed research is by nature an expensive and long range business. Reliable conclusions cannot be drawn from a short piece of record, and findings in one location may be widely modified in another place where soils, climate, and crops are different. It is therefore imperative that research plans be wisely laid. In addition to the currently apparent needs across the country we should keep a close check on the findings of the experimental soil-water-plant research which goes on cooperatively between the Department of Agriculture and the state experiment stations. The most promising findings of this work should be tried out on watersheds. Only in this way will the results be ready when the widespread need is apparent.

In the past 20 years our understanding and appreciation of experimental design have been much sharpened. New watershed work should be started with the active participation of statistical consultants, so that when the experiment is ripe for termination some years later it will be possible to draw significant conclusions. We have learned other things, too, during these past two decades. One of these is to keep our data processing current with record collection. At reasonable intervals these data should be subjected to analysis to decide whether the point of diminishing returns has been reached. This will ordinarily be determined by whether there has been an adequate sample of the longtime weather expectancy, and secondly, whether the correlations between cause and effect are statistically significant. Only in this way can these longtime experiments be terminated without risking too little record to be conclusive or so much data as to be wasteful. And it *is* wasteful to collect more than adequate data when the decks should be cleared for experiments dealing with new ideas that continually come from the laboratory and the small plots.

It must be recognized that we cannot experiment on each creek in the United States, nor on each stream for which there will be a program of watershed protection and flood prevention. Therefore, we must choose our research locations with great care so the results will have the widest possible application. We should also strive to understand the underlying causes for the effects that we measure, so that with widespread locations and generalized understanding we can define reasonable limits for extrapolation of our findings.

Finally, we have an obligation not only to carry our experiments to conclusion and interpretation, but to present these results in a useful and clear-cut form which invites use and application. It should be the researchers' ambition not only to find answers, but to see them used. The established close cooperation between the SCS and the watershed hydrology section of ARS, we think, will insure this.

PLANT REGULATORS IN AGRICULTURE. H. B. Tukey, editor. 268 pp. 1954. New York: John Wiley & Sons, Inc., 440 Fourth Avenue, New York 16. $5.50.

The editor has used the "group approach" in presenting the available information on plant regulators. Sixteen of the best known authorities on the subject aided the editor by preparing different phases of the subject, each in his own specialty, so that greatest coverage of the material is obtained. This gives more authority to the book, and the style of writing was so skillfully edited the reader is unaware that it is from 17 different authors.

The authors have presented their material on plan regulators to give an average college graduate in agriculture a workable understanding of the significance of plant regulators, what they are, how they operate, and where they belong in agriculture. It is implied that those trained in the agricultural sciences and working with farm people and their programs need to understand basic principles of how plants respond to plant regulators, what physiological processes are involved, what plant parts are likely to be affected, and in what way

internal and external environments may be involved. Accordingly, the material is not intended as a handbook of recommended practices. Instead it is prepared to provide background material. Each chapter is prepared in such a way as to begin with elementary facts and principles, and to move from there to more involved and advanced phases. Any person who really masters the material presented in the book in its entirety will have a good understanding of plant regulators and may feel well informed in the field.

A fundamental course in plant anatomy and plant physiology is extremely helpful in understanding the effect various kinds of plant regulators have on different kinds of plants. Much of this type of background is given in the first two chapters of the book before going into the chemical nature of the many plant growth regulators on the market. Following chapters give understanding to the use of plant regulators in encouraging root development; in controlling flowering and fruiting habits; in abscission of leaves or fruits and its prevention or control; the inhibition of sprouting of plants or plant parts in storage; in breeding of plants; in controlling weeds in lawns and under various crop and field conditions; and to equipment and methods for the application of the various plant growth regulators.

A person does not need to be a highly trained electrician to be able to understand why a light goes out when the switch is thrown. Neither does one need to be a highly trained chemist, plant physiologist, plant breeder or any one of a number of plant scientists to have a working knowledge of plant regulators and how they can be made to affect plant growth.

Plant regulators are fast becoming a very practical and useful tool in agriculture. Probably we are just at the beginning of a period of expansion in the use of these tools. It is important that men trained in the technical phases of agriculture and working with farmers have at least the basic training in plant regulators so they can make the greatest practical use of them. This book has been prepared with this view in mind and is well worth the studying.

—GROVER F. BROWN

MORTGAGE LENDING EXPERIENCE IN AGRICULTURE. By Lawrence A. Jones and David Durand. 233 pp. Illustrated. 1954. New Jersey: Princeton University Press. $5.

The economy of American landowners has reacted like a seesaw since the end of the eighteenth century. Boom in wartime and debt distress following war has been typical of the nation's agriculture.

The authors analyze the history and causes of distress in the various geographical areas of the country. Shifts in kind and size of operations, increasing land prices and mortgage debt, cultural change, drought, insects and rodents are evaluated as they affect agricultural production in various farming and ranching regions. Other factors are examined, such as differences in managerial ability of operators with similar kinds of operations, relationship between land quality, its sale price, producing power and debt load.

Evaluations show that fertile land with little tendency to erode appears capable of carrying greater debt load in proportion to appraised value than land low in fertility and subject to erosion. Operators with less productive land make exchanges oftener, and this type of holding is less apt to be transferred through inheritance or other family transactions.

—B. W. ALLRED

A WORKBOOK IN GENERAL AGRICULTURE. By Glenn E. Karls. 215 pp. Illustrated. 1954. Danville, Ill.: The Interstate Printers and Publishers.

AS stated in the preface, this book is intended as, "a discussion guide and work book in agriculture for elementary schools and high schools throughout the nation." It treats agriculture as, "the basic industry of the world, providing the basic necessities of life—food, shelter, and clothing to all people." The author is head of the agriculture department, Southwest Missouri State College.

This is exactly what it claims to be—a workbook. It is replete with scorecards and outlines and forms to be filled in by the student. Its general list of references is presented at the outset, for actual use, rather than thrown in at the end as an afterthought; each unit is

terminated with its own list of bulletins and other references of more specific application.

The nine units are as follows: American Agriculture, Soils, Conservation, Dairying, Poultry, Vegetables and Small Fruits, Farm Animals, Farm Crops, Farm and Home.

Necessarily elementary, the workbook nevertheless is up to date. Included is a standard scorecard for land and soil conservation judging; also, the accepted land use capability classification.

Paper covered and in the convenient size of 8½ by 11 inches, this publication may be expected to find its way to many a school desk, where it will help the young generation toward a proper understanding of modern American agriculture.

—W. B.

PRINCIPLES OF FARM MANAGEMENT. By J. Norman Efferson. 431 pp. Illustrated. 1953. New York: McGraw-Hill Book Company, Inc. $6.

The author proceeds with the thesis that farming is a very complicated business. He examines farming in the light of a business enterprise and sets forth his ideas on how to set up a farming operation for profit.

Dr. Efferson says: "The typical farm operator of even a very small farm is an investor, a manager, a laborer. On larger units he is, in addition, an accountant, a labor-relations expert, and on occasions a veterinarian, a plant pathologist, or an entomologist. Because of the multiple-purpose nature of the ordinary farm business, statistical measures to determine the financial position, success, or failure of a farm business are difficult to establish."

There is a good chapter on marketing costs and methods of doing this phase of the job better and cheaper. The chapters dealing with production and labor efficiency will appeal to those caught in the current "cost-price squeeze." Other good chapters include those on "Establishing the Farm Business," "Managing Farm Finances and Organizing," and "Operating the Farm Business."

This book is suitable as a text for farm management students and is written so understandably that farmers also can make ready use of it. The author made no atempt to cover business management as it specifically applies to western ranching.

—B. W. ALLRED

TREE FARM

(Continued from page 185)

here," said Harry Hammet, work unit conservationist. "And in addition to these youngsters, this timber management plan on this old sandpit property is serving as a model demonstration for woodland owners and developers throughout the state."

In Caddo Parish the district has made amazing progress in the past few years in promoting more planting of trees, conservation, and proper timber management.

Prior to 1952, practically no pines were planted in the parish, but since then the number planted in Caddo Parish through this fine work has increased almost tenfold each year. In 1952, 75,000 seedlings were planted; in 1953 the number jumped to 721,000; and last year, the figure was 1,317,200.

Such progress is truly remarkable, and casts an optimistic light on the future of the timber industry in this section. Only God can make trees—but many can help conserve them.

A VOICE FOR DISTRICTS

(Continued from page 177)

tall fescue grass was getting a good start in Alabama, many of the seed patches were badly infested with ryegrass. He did a special broadcast reminding farmers of the importance of harvesting and selling pure seed.

Describing the difference in appearance between fescue and ryegrass seed heads, he urged farmers having infested fields not to put such seed on the market. By following up with his seedsmen friends and with harvesters, he played a big part in the movement of pure seed from one farm to another.

Anyone who has something sound and progressive to present to farmers in north Alabama goes looking for Jesse Culp to help with the job. And if it's soil and water conservation you are promoting, Jesse will come to you

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